

ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS
AND SUBSEQUENT ORBITAL INVESTIGATIONS

Grant NAGW-1489

Annual Performance Report

For the period 1 January through 31 December 1994

Principal Investigators

Dr. Brian G. Marsden

Dr. Richard E. McCrosky

May 1995

prepared for

National Aeronautics and Space Administration

Washington, D.C.

Smithsonian Institution

Astrophysical Observatory

Cambridge, Massachusetts 02138

The Smithsonian Astrophysical Observatory
is a member of

Harvard-Smithsonian Center for Astrophysics

The NASA Technical Officer for this grant is

Dr. J. Rahe, Code EL-4, NASA Headquarters,
Washington, D.C. 20546

INTERNL

7N-89-CR

OCIT

49964

p. 14

N95-71225

Unclass

0049964

29/89

(NASA-CR-198623) ASTROMETRIC
OBSERVATIONS OF COMETS AND
ASTEROIDS AND SUBSEQUENT ORBITAL
INVESTIGATIONS Semiannual Progress
Reports Nos. 11 and 12 and Annual
Performance Report, 1 Jan. - 31
Dec. 1994 (Smithsonian
Astrophysical Observatory) 14 p



ASTROMETRIC OBSERVATIONS OF COMETS AND ASTEROIDS AND SUBSEQUENT ORBITAL INVESTIGATIONS

Semiannual Progress Report Nos. 11 and 12

1. *Personnel*

Observations, data reduction and interpretation of results contributing to this research are performed under the general direction of Principal Investigator B. G. Marsden. The observations are made by R. E. McCrosky. The selection of objects to be observed and the verification of the results are mainly by C. M. Bardwell, with some assistance from G. V. Williams and D. W. E. Green. Orbit computations are mainly by Marsden and Williams. The services of Marsden, Bardwell and Green are provided at no cost to NASA.

2. *Observing Program*

The 1.5-m reflector at the Oak Ridge Observatory in Harvard, Massachusetts, is normally scheduled for CCD astrometric observations of comets and minor planets on the nine nights surrounding each new moon. The absence of the mirror for realuminization in Arizona prevented observations from being made during early November-late February. The December observing time was therefore spent making plans for observations with the 0.4-m reflector instead. This telescope was successfully used for the program during the dark runs in early January and late January-early February, but the necessarily longer exposures significantly reduced the number of objects that could be observed. Aside from the December hiatus, the number of nights each month that were at least partly usable for observations averaged six, ranging from eight in October and late January-early February to four in June and early January. The best observing month was late February-early March, with 457 observations. The average number of observations on a usable night throughout the year was 48 (one less than in the previous year), while the best night was March 3-4 with 126 observations. The reduced positions from a monthly run are usually complete by dawn on the run's last scheduled night and are then e-mailed to Cambridge for checking and orbit computations.

Pages 4-13 list the 3181 Oak Ridge observations published during the year. Only the objects and time of observation are given; the complete observations can be found in the *Minor Planet Circulars*. These include 25 observations left over from previous years. There are 92 observations of comets (and it should be noted that these are listed using the new 1994 IAU designation system), 1457 of unnumbered minor planets and 1419 of numbered

minor planets (although only 213 were of minor planets actually numbered at the time the observations were made).

3. *Results of Special Interest*

Observations were made of 15 comets, sometimes within days of discovery or recovery, although more emphasis is placed on ensuring that long arcs of observation are secured. There was particularly good Oak Ridge coverage of comet 9P/Tempel 1, and two of the three nuclei of 51P/Harrington were recorded.

Observations were made of nine new earth-approaching minor planets, as well as of four unnumbered earth approachers from previous years and nine numbered earth approachers.

The following minor planets were newly numbered *solely* because of observations at Oak Ridge: (5927), (5930), (5936), (5940), (5942), (5944), (5953), (5957), (5959), (5968), (5971), (5972), (5975), (5976), (5982), (5985), (5986), (5988), (5994), (6000), (6008), (6010), (6011), (6013), (6015), (6017), (6018), (6020), (6026), (6031), (6035), (6036), (6045), (6048), (6049), (6052), (6056), (6057), (6065), (6066), (6069), (6070), (6071), (6077), (6078), (6079), (6080), (6081), (6082), (6083), (6084), (6085), (6089), (6092), (6094), (6098), (6100), (6102), (6105), (6106), (6108), (6109), (6110), (6113), (6114), (6118), (6121), (6123), (6125), (6127), (6128), (6133), (6139), (6140), (6141), (6142), (6143), (6146), (6147), (6148), (6152), (6164), (6165), (6166), (6171), (6174), (6181), (6182), (6184), (6186), (6194), (6198), (6199), (6204), (6251), (6258), (6265), (6278), (6283), (6296), (6303), (6306), (6307), (6310), (6319), (6323), (6325), (6329), (6330), (6335) and (6350). These account for 26 percent of all the new numberings during the year, and the listing beginning on page 4 shows that there were at least some current observations at Oak Ridge of 64 percent of the year's numberings.

New minor planets are occasionally accidentally discovered in the course of the program. One of them, (5976) 1992 SR₂, was numbered during the year.

Of the 126 observatories around the world reporting observations of minor planets during the year Oak Ridge made the fourth largest number of observations. Most of the leaders are involved in wide-field search programs with many objects recorded in each frame, whereas the Oak Ridge frames generally involve only a single object.

4. *Orbital Investigations*

As in the past, orbit computations were made as necessary and appropriate for new and returning objects.

5. *Publications*

Observations were published on *Minor Planet Circular* Nos. 23365, 23431–23435, 23553–23554, 23562–23563, 23566–23567, 23613–23618, 23698, 23709–23710, 23731–23733, 23826–23829, 23882–23883, 23930–23934, 24024–24025, 24051–24055, 24210–24211, 24253–24254, 24326–24328, 24501–24502, 24599, 24604, 24667–24669, 24857–24858, 24935 and 25020–25024; *Minor Planet Electronic Circular* 1994-H07, J05, J06, K04, L01, P09, R02 and W03. Orbit computations appeared more generally in these publications, as well as in the *IAU Circulars*.

05953 940412.2 940415.1 05999 940511.1 06013 940507.1 06025 940515.1
05954 940409.1 940415.2 06000 940511.1 06013 940507.1 06026 940511.2
05954 940409.1 940409.1 06000 940511.1 06013 940510.1 06026 940513.2
05954 940415.1 940409.1 06000 940513.1 06013 940510.1 06026 940513.2
05957 940408.3 940415.1 06001 940513.1 06014 940408.3 06026 940609.1
05957 940408.3 940415.1 06001 940408.2 06014 940411.3 06026 940609.1
05957 940411.3 940408.2 06001 940411.2 06014 940507.2 06031 940514.2
05959 940408.3 940411.2 06001 940411.3 06014 940511.1 06031 940515.2
05959 940408.3 940409.1 06001 940507.1 06014 940511.1 06031 940515.2
05960 940409.1 940511.0 06001 940507.1 06015 940409.2 06031 940705.1
05960 940415.1 940511.1 06001 940511.1 06015 940415.2 06031 940705.1
05960 940415.1 940514.0 06003 940408.1 06015 940415.2 06032 940513.2
05961 940408.1 940514.2 06003 940411.1 06015 940513.0 06032 940513.2
05961 940408.1 940514.2 06003 940411.1 06015 940514.1 06032 940514.2
05961 940415.1 940515.2 06003 940515.0 06015 940514.1 06032 940514.2
05962 940408.2 940515.2 06005 940511.1 06016 940513.2 06033 940511.2
05962 940415.2 940511.2 06005 940513.1 06016 940514.2 06033 940513.2
05967 940409.1 940511.2 06005 940513.1 06016 940608.1 06033 940609.1
05967 940409.2 940513.2 06006 940514.1 06016 940608.1 06033 940609.1
05967 940411.1 940611.1 06006 940514.1 06016 940611.1 06033 940611.1
05967 940411.1 940611.1 06006 940515.1 06017 940611.1 06035 940511.3
05968 940411.3 940511.2 06008 940515.2 06017 940411.3 06035 940609.3
05968 940412.3 940511.3 06008 940609.1 06017 940411.3 06035 940609.3
05968 940412.3 940609.2 06008 940609.1 06017 940414.3 06035 940712.2
05968 940903.0 940609.2 06008 940609.1 06017 940514.2 06035 940712.2
05968 940903.0 940610.2 06008 940611.1 06017 940514.2 06035 940713.2
05970 940411.2 940610.2 06009 940507.2 06017 940515.2 06036 940713.2
05970 940415.2 940514.0 06009 940507.2 06018 940515.2 06036 940511.2
05970 940415.2 940515.0 06009 940509.2 06018 940408.3 06036 940511.3
05971 940409.1 940510.1 06009 940509.2 06018 940514.3 06036 940513.3
05972 940411.2 940510.1 06009 940609.1 06018 940514.3 06036 940513.3
05972 940415.2 940513.1 06009 940611.1 06018 940515.2 06036 940611.2
05972 940415.2 940513.1 06010 940611.1 06021 940515.3 06036 940705.1
05973 940408.0 940510.1 06010 940515.3 06021 940507.2 06036 940705.1
05973 940408.1 940513.1 06010 940610.2 06021 940507.2 06036 940711.0
05973 940415.1 940408.2 06010 940610.2 06021 940511.2 06039 940711.1
05974 940415.1 940415.2 06011 940515.2 06021 940608.1 06039 940511.2
05974 940408.2 940415.2 06011 940609.2 06021 940608.1 06039 940511.2
05974 940411.2 940507.1 06011 940609.2 06022 940608.1 06039 940609.1
05974 940411.2 940511.1 06012 940408.2 06022 940610.1 06039 940609.1
05975 940409.0 940511.1 06012 940511.1 06022 940610.1 06040 940611.1
05975 940415.0 940511.1 06012 940511.1 06022 940610.1 06040 940611.1
05975 940415.1 940513.1 06012 940513.1 06022 940610.1 06040 940611.1
05976 940409.0 940513.2 06012 940513.1 06023 940610.1 06041 940611.1
05976 940409.0 940408.3 06012 940511.1 06023 940610.1 06041 940611.1
05976 940415.0 940408.3 06012 940511.1 06023 940610.1 06041 940611.1
05977 940408.0 940411.3 06012 940511.1 06023 940610.1 06041 940611.1
05977 940408.1 940411.3 06012 940511.1 06023 940610.1 06041 940611.1
05977 940415.1 940507.1 06013 940507.1 06041 940610.1 06041 940611.1
05977 940415.1 940507.1 06013 940507.1 06041 940610.1 06041 940611.1
05978 940409.1 940509.2 06013 940509.2 06041 940610.1 06041 940611.1
05978 940409.1 940511.1 06013 940511.1 06041 940610.1 06041 940611.1
05978 940409.1 940511.1 06013 940511.1 06041 940610.1 06041 940611.1

06045 940610.3 06063 940609.2 06076 940909.1 06087 940909.1 940902.0
06045 940711.2 06063 940609.2 06076 940909.1 06089 940808.3 940907.0
06045 940711.2 06063 940611.2 06077 940808.3 06089 940808.3 940907.0
06045 940712.2 06063 940705.1 06077 940808.3 06089 940902.2 940903.2
06045 940712.2 06063 940712.1 06077 940908.3 06089 940902.3 940903.3
06046 940507.3 06063 940712.1 06077 940908.3 06089 940908.2 940907.3
06046 940507.3 06064 940712.3 06078 940807.3 06091 940908.2 940907.3
06046 940513.2 06064 940712.3 06078 940807.3 06091 940713.3 940807.3
06046 940513.3 06064 940713.2 06078 940809.3 06091 940713.3 940807.3
06046 940609.2 06064 940713.3 06078 940809.3 06091 940807.2 940809.3
06046 940609.2 06064 940808.2 06078 940808.2 06091 940809.3 940809.3
06048 940515.2 06065 940705.1 06078 940908.2 06091 940809.2 940902.2
06048 940515.2 06065 940712.1 06079 940908.2 06091 940809.2 940902.2
06048 940611.2 06065 940712.1 06079 940808.2 06092 940808.3 940902.2
06048 940712.1 06065 940808.0 06079 940902.1 06092 940808.3 940908.1
06048 940712.1 06065 940705.1 06079 940902.1 06092 940903.3 940711.2
06049 940609.3 06066 940705.1 06079 940904.1 06092 940904.3 940711.3
06049 940609.3 06066 940712.1 06079 940904.1 06092 940904.3 940712.2
06049 940705.2 06066 940712.1 06080 940807.2 06093 940808.2 940807.2
06049 940705.2 06066 940712.1 06080 940807.2 06093 940808.2 940807.2
06049 940711.2 06066 940809.0 06080 940809.2 06093 940902.2 940809.2
06049 940711.2 06066 940809.1 06080 940809.3 06093 940902.2 940809.2
06051 940712.2 06069 940705.2 06080 940907.1 06093 940907.2 940809.2
06051 940713.2 06069 940711.2 06080 940907.2 06093 940907.2 940809.2
06051 940713.2 06069 940808.1 06080 940909.1 06094 940807.2 940809.2
06052 940610.3 06070 940713.2 06081 940807.2 06094 940808.3 940902.1
06052 940705.2 06070 940808.1 06081 940807.3 06094 940902.2 940902.2
06052 940711.2 06071 940808.1 06081 940809.3 06094 940902.2 940908.1
06052 940705.2 06071 940808.1 06081 940809.3 06094 940907.2 940908.1
06056 940610.2 06072 940712.2 06082 940807.2 06095 940804.2 940908.2
06056 940610.3 06071 940705.3 06081 940902.2 06095 940804.2 940902.2
06056 940712.2 06071 940712.2 06081 940909.1 06095 940807.2 940902.1
06056 940712.2 06071 940807.2 06082 940909.1 06095 940807.2 940902.1
06056 940713.1 06072 940807.2 06082 940808.3 06095 940902.1 940904.1
06057 940609.2 06072 940507.2 06082 940902.2 06095 940907.1 940909.1
06057 940610.2 06072 940511.1 06082 940902.2 06095 940907.1 940909.1
06057 940610.2 06072 940511.2 06082 940908.2 06096 940907.1 940909.1
06057 940713.1 06072 940608.1 06083 940808.2 06096 940807.2 940809.3
06057 940713.1 06072 940610.1 06083 940903.2 06096 940807.2 940902.2
06058 940807.1 06073 940610.1 06083 940903.2 06096 940809.1 940902.2
06058 940807.1 06073 940808.3 06083 940908.2 06097 940903.1 940904.3
06058 940809.1 06073 940808.3 06083 940908.2 06097 940807.2 940908.3
06059 940712.2 06073 940902.3 06084 940807.3 06097 940807.2 940908.3
06059 940712.2 06073 940902.3 06084 940807.3 06097 940808.2 940908.3
06059 940712.2 06073 940904.3 06084 940903.3 06097 940808.2 941004.2
06059 940713.2 06073 940904.3 06084 940903.3 06097 940903.0 941004.2
06059 940713.2 06074 940808.2 06084 940908.2 06097 940903.1 941004.2
06059 940808.1 06074 940808.3 06084 940908.2 06097 940907.1 941007.2
06059 940808.1 06074 940907.2 06085 940908.2 06097 940910.0 940705.3
06060 940711.2 06074 940907.3 06085 940807.3 06098 940910.0 940711.2
06060 940711.2 06074 940908.2 06085 940809.2 06098 940809.1 940711.3
06060 940712.2 06074 940908.2 06085 940809.2 06098 940809.1 941004.0
06060 940712.2 06075 940712.3 06085 940907.2 06098 940902.0 941004.0
06060 940809.1 06075 940713.2 06085 940907.2 06098 940907.0 940908.3
06060 940809.1 06075 940713.2 06085 940908.1 06099 940808.1 940908.3
06062 940515.1 06076 940713.2 06085 940908.1 06099 940808.1 941003.2
06062 940515.1 06076 940809.2 06087 940902.1 06100 940808.2 941003.2
06063 940515.3 06076 940809.2 06087 940902.1 06100 940808.2 941005.2
06063 940515.3 06076 940902.1 06087 940909.1 06100 940808.2 941005.2
06063 940515.3 06076 940902.1 06087 940909.1 06100 940808.2 940408.2

06181	941107.4	06199	941031.0	06243	950131.0	06275	950305.1	950129.1
06182	941002.3	06200	940807.3	06243	950131.0	06275	950305.2	950303.0
06182	941004.3	06200	940807.3	06245	950131.1	06278	941003.3	950304.0
06182	941004.3	06200	940809.3	06245	950131.1	06278	941007.3	950304.0
06182	941103.2	06200	940809.3	06246	941103.3	06278	941007.4	941107.2
06182	941103.3	06200	941003.2	06246	941103.3	06278	941103.2	941107.3
06184	941003.2	06200	941003.2	06246	941103.3	06278	941103.2	950227.0
06184	941003.2	06200	941007.2	06249	940711.0	06278	941103.2	950302.9
06184	941008.1	06200	941007.2	06249	940713.0	06278	950126.9	950302.9
06184	941008.1	06201	941001.2	06249	940713.1	06279	950127.0	950303.0
06184	941108.1	06201	941001.2	06249	940713.1	06279	941103.3	950304.1
06184	941108.1	06201	941001.2	06249	941006.9	06279	941107.3	950304.2
06185	941008.3	06201	941003.2	06250	941103.3	06279	950105.2	950305.1
06185	941008.3	06201	941003.2	06250	941103.3	06280	950105.2	950305.1
06185	941103.2	06201	941108.1	06250	950130.1	06280	950131.2	950226.2
06185	941103.3	06202	941003.3	06251	941107.3	06280	950131.2	950226.2
06185	941107.2	06202	941003.3	06251	941107.4	06280	950203.2	950302.2
06185	941107.2	06202	941007.3	06251	950128.0	06280	950203.2	950302.2
06186	941004.3	06204	940414.2	06251	950131.0	06280	950304.1	940408.3
06186	941004.3	06204	940414.3	06251	950131.1	06280	950305.0	940513.3
06186	941007.3	06204	940415.2	06257	950131.1	06280	950305.1	940514.2
06186	941007.3	06204	940415.3	06257	941108.1	06283	941008.3	940609.1
06186	941031.2	06204	940511.1	06258	950105.1	06283	941008.3	940609.1
06186	941103.2	06204	940513.1	06258	950105.1	06283	950226.9	940611.1
06186	941103.2	06204	940513.1	06258	950203.0	06283	950227.0	931014.0
06187	941001.2	06210	941007.3	06258	950203.1	06283	950303.9	950203.0
06187	941001.2	06210	941007.3	06261	941003.3	06283	950304.0	950203.1
06187	941003.2	06212	941007.3	06261	950303.0	06286	940807.2	950303.0
06187	941031.1	06212	941008.3	06261	950303.0	06286	940807.2	950303.0
06187	941103.1	06212	941008.3	06261	950304.9	06286	940809.2	950304.0
06189	941003.1	06214	941003.3	06265	950304.9	06286	940903.1	950304.0
06189	941003.1	06214	941007.2	06265	940515.1	06286	940908.1	950303.1
06189	941005.1	06214	941007.2	06265	940515.1	06286	940908.1	950303.1
06189	941005.1	06214	941007.3	06265	940609.1	06287	950131.1	950304.1
06189	941005.0	06216	950128.1	06265	940609.1	06287	950131.1	950126.3
06189	941108.0	06216	950128.2	06265	940611.1	06287	950303.0	950128.4
06190	941031.2	06216	950130.1	06265	940611.1	06287	950303.0	950227.2
06190	941103.2	06216	950130.1	06267	950304.1	06287	950304.0	950227.2
06190	941103.2	06216	950130.1	06267	950304.1	06288	950227.0	950305.2
06192	941004.2	06217	950105.1	06267	950305.0	06288	950227.1	950305.2
06192	941004.2	06217	950128.0	06267	950305.1	06288	950303.1	950126.3
06192	941007.2	06217	950128.1	06271	941001.0	06288	950303.1	950126.3
06193	941108.0	06217	950203.0	06271	941001.1	06289	950129.4	950128.3
06193	941108.0	06222	950203.1	06271	941004.0	06289	950131.4	950227.2
06194	941008.3	06222	950203.0	06272	941004.1	06289	950302.2	950227.2
06194	941008.3	06222	950203.1	06272	950130.2	06289	950302.2	950304.2
06194	941103.3	06223	941008.2	06272	950130.3	06290	950129.3	950304.2
06194	941103.3	06223	941008.2	06272	950201.2	06290	950129.3	950227.2
06194	941107.3	06223	941031.1	06272	950201.2	06290	950304.2	950227.2
06196	941031.0	06223	941031.2	06272	950227.1	06290	950305.1	950302.2
06196	941031.0	06223	941103.1	06272	950304.1	06290	950305.1	950302.2
06198	941004.3	06223	941103.2	06272	950304.1	06290	950305.2	950304.2
06198	941004.3	06228	950203.0	06274	950304.1	06292	950227.0	950304.2
06198	941007.3	06228	950203.0	06274	950227.2	06292	950227.0	950129.4
06198	941007.3	06235	950203.0	06274	950304.2	06292	950304.0	950226.3
06198	941107.2	06235	950203.1	06274	950304.2	06294	950129.2	950226.3
06199	941107.2	06238	941107.2	06275	950126.2	06294	950203.2	950302.3
06199	941006.1	06241	941107.2	06275	950126.3	06294	950203.2	950126.2
06199	941006.1	06241	941008.0	06275	950128.2	06295	950305.0	950126.2
06199	941008.1	06242	941008.0	06275	950128.3	06295	950203.1	950203.3
06199	941031.0	06242	950127.1	06275	950304.2	06296	950203.1	950304.1
06199	941031.0	06242	950127.1	06275	950304.2	06296	950127.1	950304.2

1981 ES29	950304.0	1983 BH	940408.1	1985 QH5	941009.2	1987 KD1	950305.2	1988 BX	940705.2
1981 ES29	950304.0	1983 EM1	940903.2	1985 QH5	941107.1	1987 KD1	950305.3	1988 BX	940712.2
1981 GG	940511.1	1983 EM1	940903.2	1985 QH5	941107.1	1987 MC	940713.0	1988 BX	940712.2
1981 GG	940513.1	1983 EM1	940909.2	1985 RC4	940514.2	1987 MC	940713.1	1988 BX	940808.1
1981 RA2	940513.1	1983 EM1	940909.2	1985 RC4	940515.2	1987 MC	940808.0	1988 BX	941008.0
1981 RA2	940609.2	1983 RQ4	940611.2	1985 RC4	940515.2	1987 MC	940808.0	1988 BX	941008.0
1981 RA2	940611.2	1983 RQ4	940611.2	1985 RC4	940609.1	1987 ML1	950131.3	1988 BP3	940712.2
1981 RA2	940705.1	1983 RR4	940713.2	1985 RC4	940609.2	1987 ML1	950131.4	1988 BP3	940712.3
1981 RA2	940705.2	1983 RR4	940713.3	1985 SM2	941103.2	1987 ML1	950226.3	1988 BP3	940713.2
1981 RA2	940711.2	1983 RR4	940808.2	1985 SM2	941107.2	1987 ML1	950226.3	1988 BP3	940713.2
1981 RA2	940711.2	1983 RR4	940808.2	1985 SM2	941107.2	1987 QH3	940902.2	1988 BP3	940902.1
1981 RC5	950105.1	1983 XG	941001.2	1986 AE	950126.2	1987 QH3	940908.2	1988 BP3	940907.1
1981 RC5	950105.1	1983 XG	941001.3	1986 AE	950126.2	1987 QH3	940908.2	1988 BP3	940907.1
1981 RC5	950106.0	1983 XG	941004.2	1986 AE	950128.2	1987 QH3	940908.2	1988 BP3	940907.1
1981 RC5	950106.1	1983 XG	941004.2	1986 AE	950227.0	1987 QH3	941004.1	1988 BP3	940909.0
1981 SE	950304.2	1983 XG	941103.1	1986 AE	950227.0	1987 QH3	941004.1	1988 BP3	940909.1
1981 SE	950304.3	1983 XG	941108.1	1986 AE	950304.0	1987 QH3	941004.1	1988 BS3	950226.3
1981 SE	950305.2	1983 XG	941108.2	1986 AE	950304.1	1987 QH3	941007.1	1988 BS3	950302.3
1981 SE	950305.3	1984 CF	940414.3	1986 PF	950304.1	1987 QH3	941007.1	1988 BS3	950302.3
1981 SY1	940515.1	1984 CF	940414.3	1986 PF	940705.1	1987 QR11	940514.0	1988 CG	950227.3
1981 SA5	940515.1	1984 CF	940415.3	1986 QQ	940712.0	1987 QR11	940514.0	1988 CG	950227.3
1981 SA5	940408.2	1984 CF	940415.3	1986 QQ	950226.2	1987 QR11	940515.0	1988 CG	950302.2
1981 SA5	940408.2	1984 CF	940415.3	1986 RE2	950226.2	1987 QR11	940515.0	1988 CH2	950305.0
1981 SA7	950203.0	1984 CF	940511.1	1986 RE2	940705.2	1987 RE1	940902.2	1988 CH2	950305.0
1981 SA7	950203.0	1984 CF	940511.1	1986 RE2	940712.2	1987 RE1	940902.2	1988 CF7	940712.2
1981 UM22	950226.2	1984 CF	940513.1	1986 RE2	940712.2	1987 RE1	940907.2	1988 CF7	940713.2
1981 UM22	950226.2	1984 DA	950302.3	1986 RE2	940808.1	1987 SG3	940705.2	1988 CF7	940713.2
1981 UM22	950302.3	1984 DA	950302.3	1986 RA5	940808.1	1987 SG3	940705.2	1988 CF7	940808.1
1982 BP2	940808.2	1984 DA	950304.4	1986 SZ1	940713.2	1987 SG3	940707.2	1988 DO1	950304.3
1982 BP2	940808.2	1984 DA	950304.4	1986 SZ1	940713.2	1987 SG3	940707.2	1988 DO1	950304.3
1982 FS3	940609.2	1984 DY	950227.2	1986 SZ1	940902.0	1987 SG3	940804.1	1988 DO1	950304.3
1982 FS3	940609.2	1984 DY	950227.2	1986 SZ1	940902.0	1987 SG3	940804.1	1988 DO1	950304.3
1982 RK	940408.1	1984 DY	950302.2	1986 SZ1	940903.0	1987 SG3	940807.1	1988 KA	940608.1
1982 RK	940408.2								

1991 GV1	950302.3	1991 TO13	941007.1	1992 ED1	941006.1	1992 UT5	950304.3	1993 DO	940514.2
1991 GB2	950129.3	1991 TO13	941008.1	1992 ED1	941031.0	1992 UT5	950304.3	1993 DO	940514.2
1991 GB2	950129.3	1991 TO13	941008.1	1992 ED1	941031.0	1992 UT5	950304.3	1993 DO	940514.2
1991 GB2	950304.2	1991 UM	940903.1	1992 ED1	94104.9	1992 UT5	950305.3	1993 DO	940515.2
1991 GB2	950304.2	1991 UM	940903.1	1992 ED1	941105.0	1992 WM3	940515.1	1993 DO	940609.1
1991 GB2	950305.2	1991 UM	940909.1	1992 EM1	950106.0	1992 WM3	940515.2	1993 DO	940609.1
1991 GB2	950305.2	1991 UM	940909.1	1992 EM1	950106.0	1992 WM3	940515.2	1993 DO	940609.1
1991 PZ11	940409.0	1991 UV	940609.3	1992 FY1	950110.0	1992 WR3	940408.2	1993 FB1	940809.3
1991 PZ11	940409.1	1991 UV	940712.2	1992 FY1	950110.1	1992 WR3	940408.2	1993 FB1	940809.3
1991 PF15	940808.0	1991 UV	940712.2	1992 FY1	950130.0	1992 WR3	940411.2	1993 FB1	941007.1
1991 PF15	940808.0	1991 UV	940713.2	1992 FY1	950130.1	1992 WR3	940411.2	1993 FB1	940809.2
1991 PH15	940409.2	1991 UV	940713.2	1992 FY1	950203.0	1992 WR3	940510.1	1993 FC1	940809.2
1991 PH15	940409.2	1991 UV	940713.2	1992 FY1	950203.0	1992 WR3	940510.1	1993 FC1	940809.2
1991 PH15	940409.2	1991 UM1	940713.2	1992 FY1	950227.2	1992 WR3	940513.1	1993 FC1	940903.1
1991 PH15	940415.2	1991 UM1	940713.2	1992 HJ	950227.2	1992 WP4	940514.0	1993 FC1	940903.1
1991 PH15	940507.1	1991 UM1	940808.2	1992 HJ	950302.1	1992 WP4	940514.1	1993 FC1	940908.1
1991 PH15	940507.1	1991 UT3	940909.1	1992 HJ	950302.2	1992 WY4	940711.2	1993 FC1	941007.0
1991 PH15	940511.1	1991 UT3	940909.1	1992 HY4	950302.2	1992 WY4	940711.2	1993 FC1	941007.0
1991 PH15	940511.1	1991 UT3	940909.1	1992 HY4	950302.2	1992 WY4	940712.1	1993 FSL	940515.3
1991 RM2	940808.0	1991 UU3	940809.2	1992 JA	950203.0	1992 WM5	940511.1	1993 FSL	940515.3
1991 RM2	940808.0	1991 UU3	941004.0	1992 JA	950203.1	1992 WM5	940511.1	1993 FSL	940610.2
1991 RD24	940414.2	1991 UU3	941007.0	1992 JA	950303.0	1992 WM5	940513.1	1993 FSL	940610.2
1991 RD24	940414.3	1991 VR3	940809.1	1992 JA	950303.0	1992 WM5	940513.1	1993 FSL	940705.2
1991 RD24	940415.2	1991 VR3	940809.2	1992 JA	950304.0	1992 WM5	940608.0	1993 FSL	940705.2
1991 RD24	940415.3	1991 VR3	940907.0	1992 JA	950304.0	1992 WM5	940608.0	1993 FSL	940711.2
1991 RD24	940510.1	1991 VR3	940907.1	1992 LM	941107.2	1992 YM	940513.1	1993 FSL	940711.2
1991 RD24	940510.2	1991 VC4	940609.2	1992 LM	950105.0	1992 YM	940513.2	1993 FSL	940807.1
1991 RD24	940513.1	1991 VC4	940711.1	1992 LM	950106.0	1992 YM	940610.1	1993 FSL	940807.1
1991 RB25	940514.1	1991 VC4	940712.1	1992 LM	950106.1	1992 YM	940610.1	1993 FSL	940809.1
1991 RB25	940514.1	1991 VF5	940903.2	1992 LN	950131.2	1992 YB1	940510.1	1993 FZ12	940712.2
1991 RB25	940515.1	1991 VF5	940903.3	1992 LN	950131.2	1992 YB1	940510.1	1993 FZ12	940712.2
1991 RB25	940515.1	1991 VF5	940907.3	1992 LN	950203.2	1992 YB1	940513.1	1993 FZ12	940713.2
1991 SF1	940408.3	1991 VF5	940907.3	1992 LN	950203.2	1992 YB1	940513.1	1993 FZ12	940713.2
1991 SF1	940408.3	1991 YF	941008.1	1992 LN	950304.1	1992 YW3	940513.2	1993 FZ12	940903.0
1991 SF1	940411.2	1991 YF	930722.1	1992 LN	950305.0	1992 YW3	940513.2	1993 FZ12	940903.0
1991 SF1	940411.3	1991 YG	941001.2	1992 LN	950305.1	1992 YW3	940514.2	1993 FZ12	940903.0
1991 SF1	940507.1	1991 YG	941001.2	1992 MJ	950304.3	1992 YW3	940514.2	1993 FZ12	940903.0
1991 SF1	940507.1	1991 YG	941003.2	1992 MJ	950305.3	1992 YW3	940514.2	1993 FZ12	940903.0
1991 SF1	940509.2	1992 AO	940809.3	1992 OG	940513.2	1992 YW3	940608.1	1993 FZ12	940903.0
1991 SF1	940511.2	1992 AO	940809.3	1992 OG	940513.2	1992 YW3	940608.1	1993 FZ12	940903.0
1991 SJ1	940511.3	1992 CA	950226.3	1992 OG	940514.1	1992 YW3	940610.1	1993 FZ12	940903.0
1991 SJ1	940513.2	1992 CA	950302.3	1992 OG	940514.1	1992 YW3	940705.1	1993 FZ12	940903.0
1991 SJ1	940513.3	1992 CA	950302.3	1992 OG	940608.1	1993 BP13	940705.1	1993 FZ12	940903.0
1991 SJ1	940609.2	1992 CG1	930722.0	1992 OG	940608.1	1993 BP13	940705.1	1993 FZ12	940903.0
1991 SJ1	940609.2	1992 CG1	930722.1	1992 OG	940610.1	1993 BP13	940705.1	1993 FZ12	940903.0
1991 SJ1	940610.2	1992 EF	940807.2	1992 PF2	950304.3	1993 CC	940712.2	1993 FZ12	940903.0
1991 SN1	940705.2	1992 EF	940807.2	1992 PF2	950304.3	1993 CC	940712.2	1993 FZ12	940903.0
1991 SN1	940705.2	1992 EF	940809.2	1992 PF2	950305.3	1993 CC	940713.1	1993 FZ12	940903.0
1991 SN1	940711.2	1992 EF	940809.2	1992 PF2	950305.3	1993 CC	940713.2	1993 FZ12	940903.0
1991 SN1	940807.1	1992 EF	940902.1	1992 SB1	931116.3	1993 CC	940807.1	1993 FZ12	940903.0
1991 SN1	940807.1	1992 EF	940902.2	1992 SB1	931116.4	1993 CC	940807.1	1993 FZ12	940903.0
1991 SN1	940809.1	1992 EF	940908.1	1992 SB1	940313.0	1993 CC	940809.1	1993 FZ12	940903.0
1991 SN1	940809.1	1992 EF	940908.1	1992 SB1	940313.0	1993 CC	940809.1	1993 FZ12	940903.0
1991 TJ2	940712.3	1992 ED1	930618.1	1992 SW10	940408.1	1993 CN	940809.1	1993 FZ12	940903.0
1991 TJ2	940712.3	1992 ED1	930618.2	1992 SW10	940408.1	1993 CN	940809.1	1993 FZ12	940903.0
1991 TJ2	940713.3	1992 ED1	940903.2	1992 SU21	950227.2	1993 CN	940408.3	1993 FZ12	940903.0
1991 TJ2	940713.3	1992 ED1	940903.2	1992 SU21	950227.2	1993 CN	940415.3	1993 FZ12	940903.0
1991 TJ2	940808.2	1992 ED1	940908.2	1992 SU21	950227.2	1993 CN	940415.3	1993 FZ12	940903.0
1991 TJ2	940808.2	1992 ED1	940908.2	1992 SU21	950302.2	1993 CN	940507.2	1993 FZ12	940903.0
1991 TG4	950105.1	1992 ED1	941003.1	1992 TC	950302.2	1993 CN	940507.2	1993 FZ12	940903.0
1991 TG4	950105.1	1992 ED1	941003.1	1992 TC	941004.3	1993 CN	940511.2	1993 FZ12	940903.0
1991 TO13	941007.1	1992 ED1	941006.1	1992 TC	941008.3	1993 CP1	940713.2	1993 FZ12	940903.0
1991 TO13	941007.1	1992 ED1	941006.1	1992 TC	941008.3	1993 CP1	940713.2	1993 FZ12	940903.0

[illegible]

